

said insulating walls, phosphors, colour filters and dielectric protecting layers shall be regarded as a (non-continuous) functional layer which may be applied in the method of the present invention."

FEDs also comprise two substrates which are provided with functional layers. In addition to the electroconductive layers and patterns known from LCDs and PDs, one of the substrates of a FED is provided with a large number of microtips, consisting of e.g. molybdenum, which each act as a microscopic electron gun. When charged up to a high voltage from 200 to 800 V, these microtips emit an electron beam towards a phosphor layer on the opposite substrate which typically carries an ITO layer as a counter electrode. The electroconductive layers and patterns, microtips and phosphor layers in FEDs shall also be regarded as functional layers which may be applied in the method of the present invention.

OLEDs are electroluminescent devices wherein electrons and holes are injected from a cathode and anode respectively into an electroluminescent material, e.g. an electroluminescent polymer such as poly(p-phenylenevinylene) (PPV) and its derivatives, fluorene derivatives or distyrylbenzene compounds, and then recombine to an exciton which relaxes to the ground state by radiative decay. Some particular examples have been disclosed in e.g. U.S. Pat. No. 5,247,190 and U.S. Pat. No. 5,540,827. Detailed information on OLEDs is published in "Organic electroluminescent materials and devices", edited by S. Miyata and H. S. Nalwa, Gordon and Breach Publishers (1997); "Organic Electroluminescent Devices", Science, Vol. 273, p. 884 (16.08.1996); Philips Journal of Research, Vol. 51, No. 4, p. 518-524 (1998); Philips J. Res., vol. 51, p. 511-525 (1998); and in Nature, vol. 347, p. 539 (1990).

In a typical OLED the following functional layers are present between two substrates:

- a reflecting cathode, e.g. a low-work function metal layer such as evaporated Ca.
- an electroluminescent layer, e.g. PPV; other suitable electroluminescent compounds are described in e.g. "Organische Leuchtdioden", Chemie in unserer Zeit, 31. Jahrg. 1997, No. 2, p. 76-86.
- an hole-injection layer, e.g. an organic electroconductive layer.
- an transparent anode, e.g. an ITO layer. Also these layer shall be regarded as a functional layer which may be present in the module made according to the present invention.

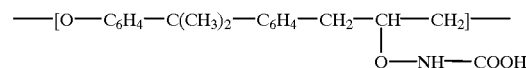
Although the OLED above comprises two inorganic electrodes, a preferred device made according to the present invention is fully composed of organic layers (excluding the glass sheets) as such layers are resistant to bending, distinguished from brittle inorganic layers such as ITO. Such devices may comprise e.g. all-organic thin-film-transistors as described in Adv. Mater. vol. 2, no. 12, p. 592 (1990).

In addition to the FPDs above, other suitable examples of devices which may be obtained by the present invention are electrolytic capacitors, circuit boards, electrochromic displays, an electronic book such as the one described in WO 97/04398 or a photovoltaic device such as an organic solar cell which comprises a similar structure as the OLED described above, with the proviso that the electroluminescent layer is replaced by a composition wherein photo-induced electron transfer occurs between an electron-donor and an acceptor.

EXAMPLE

A similar device as shown in FIG.1 was prepared. A flexible plastic film consisting of a phenoxy-urethan poly-

mer according to the following formula was used as a substrate :



wherein C₆H₄ is a phenyl group.

An ITO layer having a thickness of 500 Å was applied on one side of the plastic substrate by low temperature sputtering and then patterned into electrodes by photolithography. A polyimide resin was coated on the electrode surface at a thickness of 500 Å, dried at 150° C. for 1 hour and then rubbed with gauze in one direction so as to obtain a liquid crystal orientation layer. The material thus obtained formed a first substrate. A similar material was prepared as second substrate.

A flexible epoxy adhesive was screenprinted onto the surface of the first substrate in a sealing pattern. A silver-based conductive adhesive was applied to both substrates to form electric contacts. Fine particles of glass fibre having a diameter of 10 µm were scattered on the first substrate and then both substrates were assembled to form a panel and cured by heating at 100° C. during 1 hour. Said panel consisted of a single LCD cell. A liquid crystal composition was injected into the space between both substrates and the seals by vacuum injection. The injection inlet was sealed with an epoxy resin to obtain a liquid crystal display cell.

A polyethylene adhesive layer was then spin-coated on both outer surfaces of the panel. Finally, two borosilicate glass sheets of type AF45 (Schott Glass, Germany) having a thickness of 70 µm were laminated to both sides of the panel. A low-weight, flexible display was obtained which is well protected from oxygen, water vapour, heat and mechanical impact.

What is claimed is:

1. A method of making a module for use in an electric or electronic device, said method comprising the steps of

- (i) providing a flexible substrate with a functional layer by a printing process or a web coating process;
- (ii) bringing said flexible substrate into parallel contact with another substrate so as to obtain a module wherein the functional layer is present between both substrates;
- (iii) laminating a glass sheet having a thickness in the range from 10 µm to 0.7 mm to at least one side of the module.

2. A method of making a module for use in an electric or electronic device, said method comprising the steps of

- (i) providing a flexible substrate with a functional layer;
- (ii) bringing said flexible substrate into parallel contact with another substrate so as to obtain a panel wherein the functional layer is present between both substrates, said panel comprising a plurality of adjacent modules which are mutually separated by a boundary between said modules;
- (iii) laminating a plurality of glass sheets having a thickness in the range from 10 µm to 1.5 mm to at least one side of the panel, wherein the laminated glass sheets are aligned with the modules and are mutually spaced at the boundary between the modules.

3. A method of making a module for use in an electric or electronic device, said method comprising the steps of

- (i) providing a flexible substrate with a functional layer;
- (ii) bringing said flexible substrate into parallel contact with another substrate so as to obtain a panel wherein the functional layer is present between both substrates,